

TS410 Tubing Flow Module

Precision Volume Flow Measurements for *In Vitro* & Extracorporeal Tubing

Gold Standard Ultrasonic Transit-Time Technology

Whether you require tubing flow measurements in the animal lab or in the R&D engineering suite, Transonic's TS410 Tubing Flow Module gives you precision volume flow measurements in tubing with user friendly features applicable to laboratory bench settings, in vitro and extracorporeal use.

- True Volume Flow
- Measurement Capability for Diverse Fluids: Blood, Saline, Water, Cell Culture, Physiological Buffers, Blood Analogs such as Glycerine/Water Solutions
- Programmable Alarm Conditions:
 - High / Low Flow Threshold Alarm
 - Bubble / "Received Signal" Alarm
- On-site recalibration of Flowsensors for new parameters or conditions

ALL TYPES OF FLOW CIRCUITS

- Circulatory support device development (VAD Performance & Artificial Heart)
- Isolated heart and perfused organ studies
- Mock circulatory models
- Non-contact sterile flow measurement of biologicals and bioreactors
- Flow phantoms and any experimental, or non-human clinical or process application where flow measurement in tubing is needed.

COMPATIBLE FLOWSENSORS

- ME-PXN Inline Flowsensors
- ME-PXL Clamp-on Sterile Tubing Flowsensors



ME-PXN Inline Flowsensor and ME-PXL Clamp-on Tubing Flowsensor



T403 Console with TS410 and TS420 Modules.



TS410 Flow Module requires a T400 Console in order to take measurements. Consoles can hold multiple Modules of various functionality.

TS410 Tubing Flow Module Specifications

GENERAL FEATURES

Size: 5.125" h x 4" w x 9.062" d

Weight: 2.3 lbs.

Module fits 2 Console slots (20HP) in T402 or T403 Consoles

Power: Derives input power from Transonic® 400-Series Consoles. Installation in a Console is required.

OPERATIONAL TECHNOLOGY

Ultrasonic Transit-time

FLOWSENSOR COMPATIBILITY

ME-PXL- & ME-PXN-Series

SENSOR CONNECTOR

Front panel 16-pin connector. Accepts research Inline and Clamp-on Flowsensors and extension cables with male CC16 or CP16 connectors.

AUTOMATIC ADJUSTMENTS

Sensor size identification and corresponding flow output ranges. Volume flow calibration and serial number displayed of active Flowsensor.

DIGITAL DISPLAY

4-Digit (14 segment) LED displays Flow / Sensor data / Error Messages

Bar Indicator Light: Displays received signal for continuous monitoring of Sensor signal quality.

LCD DISPLAY

One line 16-character alpha numeric LCD displays program parameters, Sensor and Meter status, alarm settings. Default displays Sensor serial number.

SET-UP/STATUS & PROGRAM PARAMETERS

STATUS MODE: (White labels)
Status message displayed on LCD.

- Sensor Status: sensor type & calibration
- Meter Status: Active flowmeter settings & alarm status
- Alarm Mute: Audible alarm On/Off

PROGRAM MODE: (Blue labels)

- Sensor Controls: Select pre-programmed factory calibration options; Adjust Flowsensor gain to change calibration on-site.
- 1/4 Flow Scale: increases flow gain by factor of 4 for low flow measurements.
- Calibrate Scale: sets output to 0 and 1 Volt to calibrate external recording devices with scale factor flow.
- Invert flow: inverts polarity of analog outputs & flow display
- Alarms Menu: 3 level program to select, set thresholds, and activate Alarms for "Low Flow", "High Flow" and "Received Signal" Interruption

FILTER PROPERTIES

- 0.1, 10, 40 Hz: 2nd order Butterworth, with a third passive pole at 160 Hz
- 160 Hz: 3rd order Butterworth

ZERO FLOW ADJUST

Recessed momentary push button to zero flow reading at stopped flow.

FLOW OUTPUT

Front panel mounted BNC output connector & rear panel terminal block:

- Pulsatile/Average Volume Flow
- Filtering controlled by front panel selectable filters
- Voltage range: -5 to +5 volts
- Output resistance: 500 Ohm
- Full Range for Flow: -5 to +5 V (bidirectional flows, with range of 5 x scale factor flow)

AUTOMATIC DIGITAL SENSOR ID & CALIBRATION

TS410 reads operational data (size, scale & calibration) programmed in the sensor's EPROM.

ULTRASONIC FREQUENCY RANGE

600 KHz to 14.4 MHz; Sensor size dependent

SIGNAL OUTPUTS

8 accessible signals via 400-Series Flowmeter Console's back-panel terminal block: Pulsatile Volume Flow; Mean Volume Flow; Received Signal Amplitude (2); Phase (4)

SYNCHRONIZATION

Rear panel jumpers select synchronization mode

- Self-Triggering Mode: "SYNC IN" to "SYNC OUT" jumper on each Module
- Sequential Triggering Mode: "SYNC IN" crossed to "SYNC OUT" between Modules